

Overview: Session 3A

**Long-Term Performance Predictions
and Risk Assessment Integration of
Cementitious Materials in PA
Modeling**

State of the Art

- Risk-Based Guidelines for D&D
 - Site/Scenario Specific Adjustments to RESRAD
- Sulfate Attack of Saltstone Vault
 - Probabilistic Analysis to Address Uncertainty
- PA Overview of Single-Shell Tank Assessment
 - Reference Case vs. Conservative Case
 - Lay-Audience Communication
- Monitoring Strategy using Kalman Filtering
 - Balancing Predictions and Monitoring
 - Limiting Uncertainty
- Review of Cement Conditioning of Nuclear Wastes

Gaps in Knowledge

- Modeling complex systems
 - Risk due to Tank Leaks
 - Transport in Vadose Zone
 - Groundwater systems
 - Level of Detail - Over-simplification, Over-complexation
- Data Uncertainties and Limited Data Sets
 - Scenarios – closed tanks or buried vaults
 - Materials Characteristics (diffusivities, permeabilities)
 - Speciation of Rad Waste Constituents
 - Redox Couples Under Alkaline Conditions
- Coupled Mechanical / Transport Characteristics
 - Cracking – propagation, filling, etc.

Gaps in Knowledge

- Uncertainties
 - Conceptual Models
 - Assumptions – tendency toward over-conservative
 - Future Process Operations
- Current Assessment of Future Processes
 - 10,000+ years
 - Best Knowledge/Designs
 - Future Regulatory Atmosphere
 - Iterative Processes
- Short-Term Properties vs. Long-Term Performance

Opportunities

- Intellectual Exchange
 - Degradation Mechanisms
 - Model Development
- Experimentation
 - Parameterization – isolate parameter of interest
 - Validation – multiple parameters
- Advanced Assessment Techniques
 - Risk-Based End States
 - Probabilistic Release Models
 - Data/Model Uncertainty Mitigation
- Collaboration on Cement Use and Scale-Up